

TECHNICAL NOTES.

NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS.

No. 69.

AN INVESTIGATION ON THE EFFECT OF RAKED WING TIPS.

By

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Summary. - This investigation was carried out by request of the United States Air Service in the wind tunnel of the Massachusetts Institute of Technology. The results are here published by the National Advisory Committee for Aeronautics as it is thought that they may be of general interest. Wings of the R.A.F. 6 section are tested with various angles of rake, and it is found that although rake has very little effect, a positive or negative rake of 30° is the best.

Introduction. - There has been very little work done on the careful investigation of wing tip forms. For this reason the present test was carried out to investigate the influence of rake when the aspect ratio is held constant. The angles of rake tested were $0^{\circ} \pm 20^{\circ} \pm 40^{\circ}$. A greater angle of rake than this would be structurally impractical. Only lift and drag runs were made.

An investigation of rounded wing tips has been made by the British Advisory Committee (T.477) and some work along this line has been done by Eiffel.

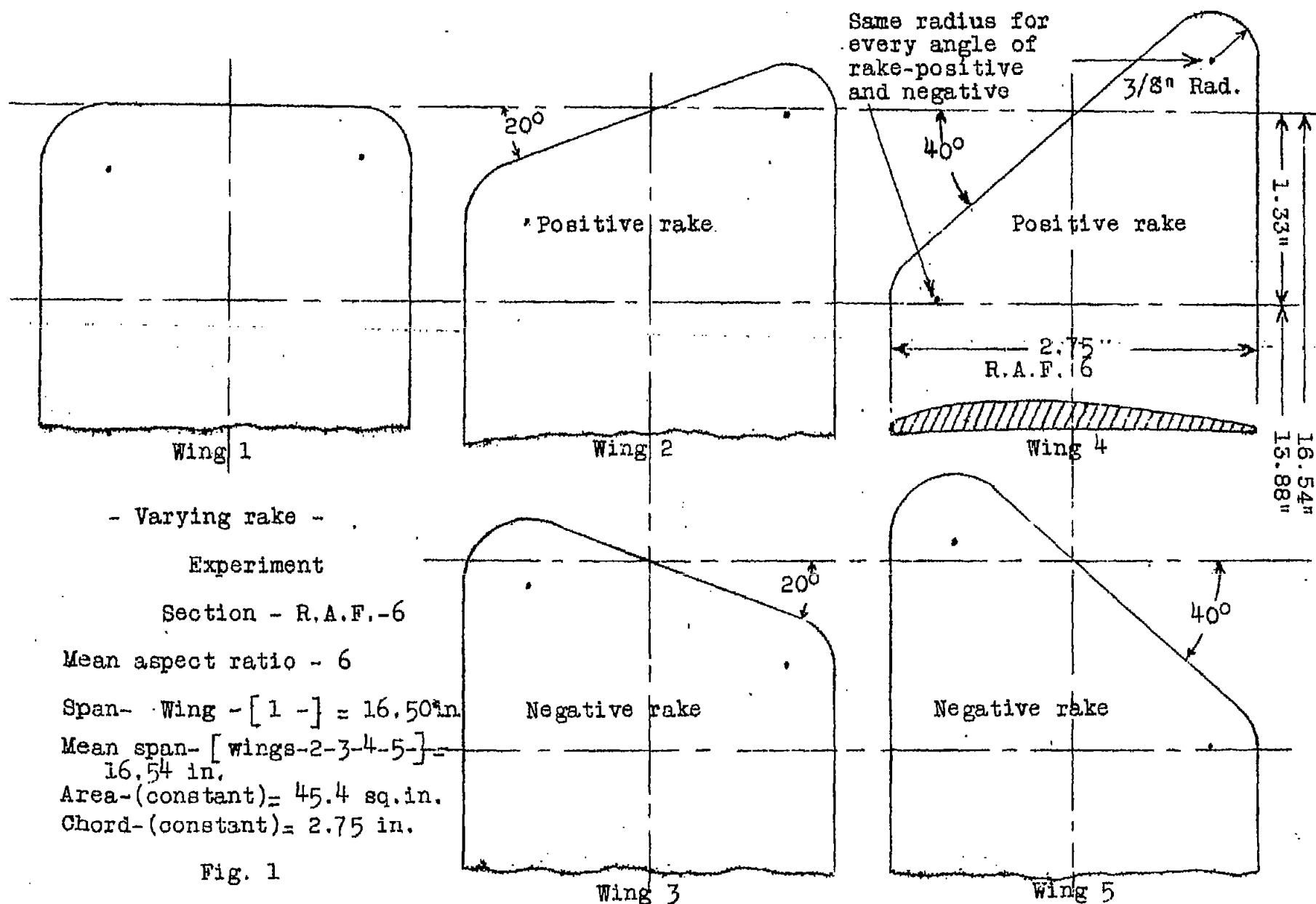
Methods. - A short section of an R.A.F. 6 wing was fastened to the crank spindle of the N. P. L. balance and the various tip sec-

tions (Fig. 1) were pinned onto the ends of it. Due to the use of the crank spindle the drag readings are too low, but as only comparative values were desired no corrections were made.

Precision.- As the differences between the various rakes were small, each set of wing tips was set and run three separate times, and the mean values taken. The precision is everywhere better than one percent.

Results.- The lift, drag and L/D are plotted in Figs. 2, 3, and 4, for various angles of rake. It is evident that the efficiency increases slightly with rake up to about 30° and then decreases, while the lift increases rather rapidly at large positive rakes. The increase in L/D at 4° incidence by using a 30° rake, as compared with a square tip, is about 7%.

Conclusions.- It may be concluded that the effect of rake on the lift and drag are so small that considerations of strength and aileron efficiency should govern the wing tip form.



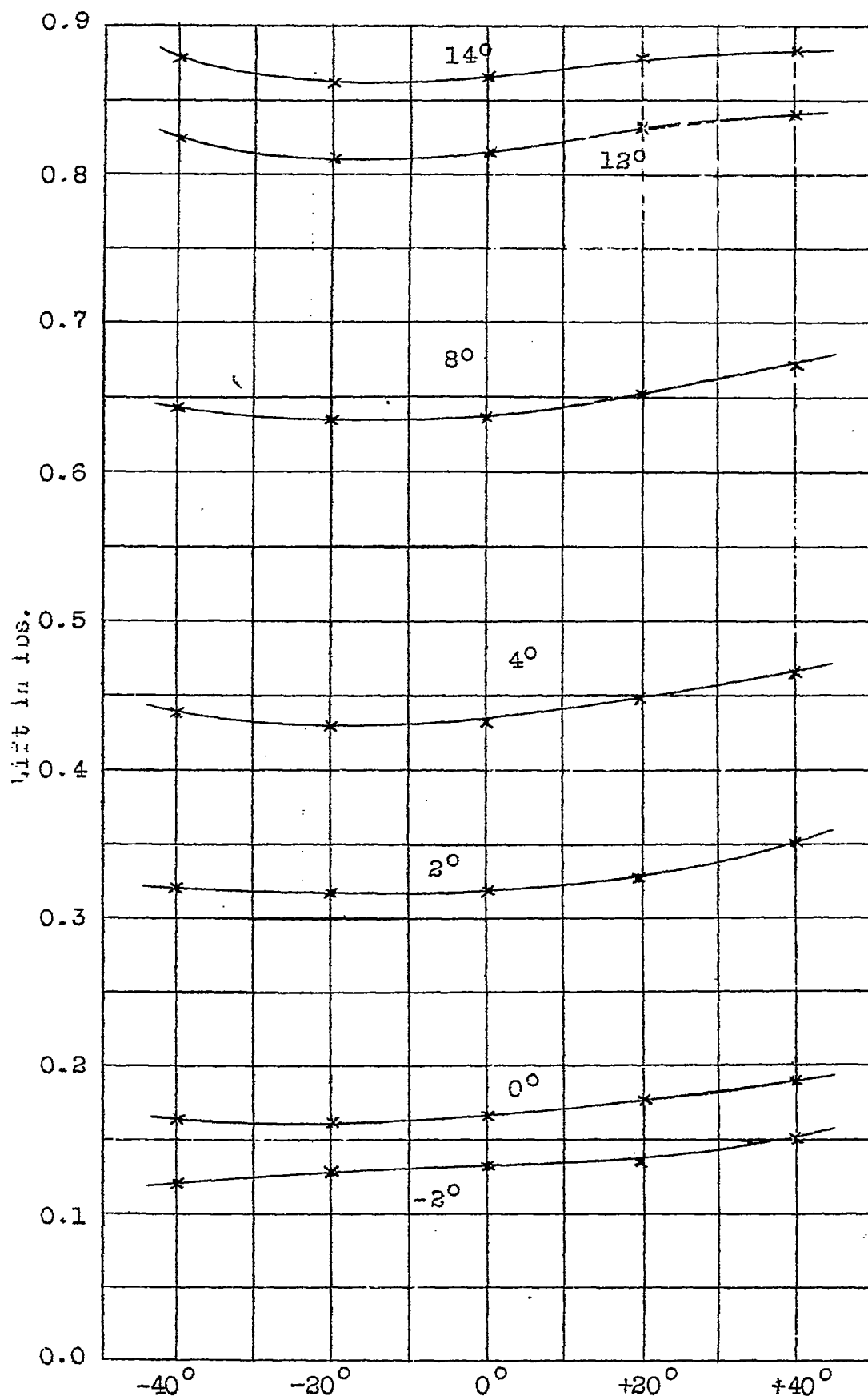


Fig. 2.

Angle of rake.

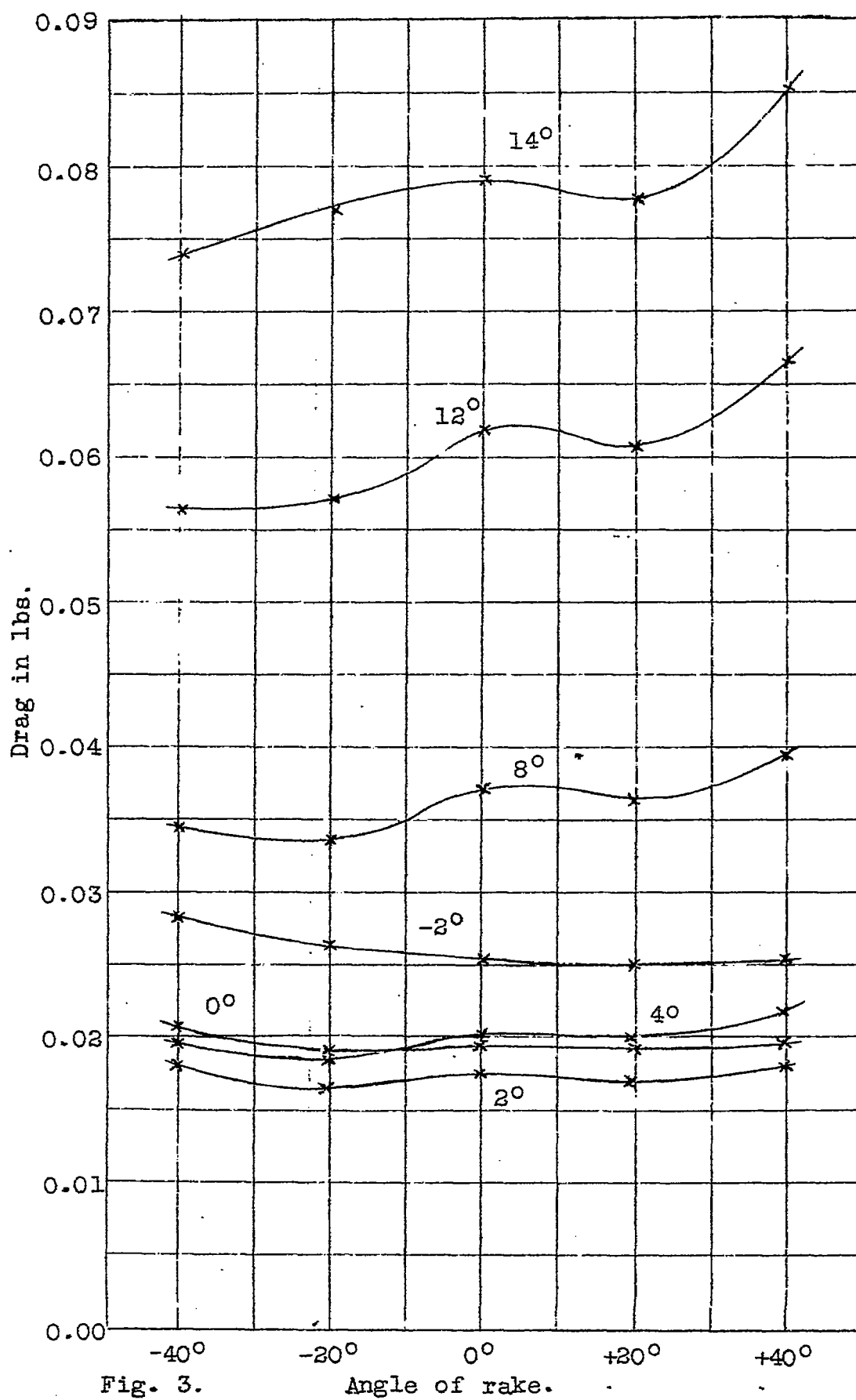


Fig. 3.

Angle of rake.

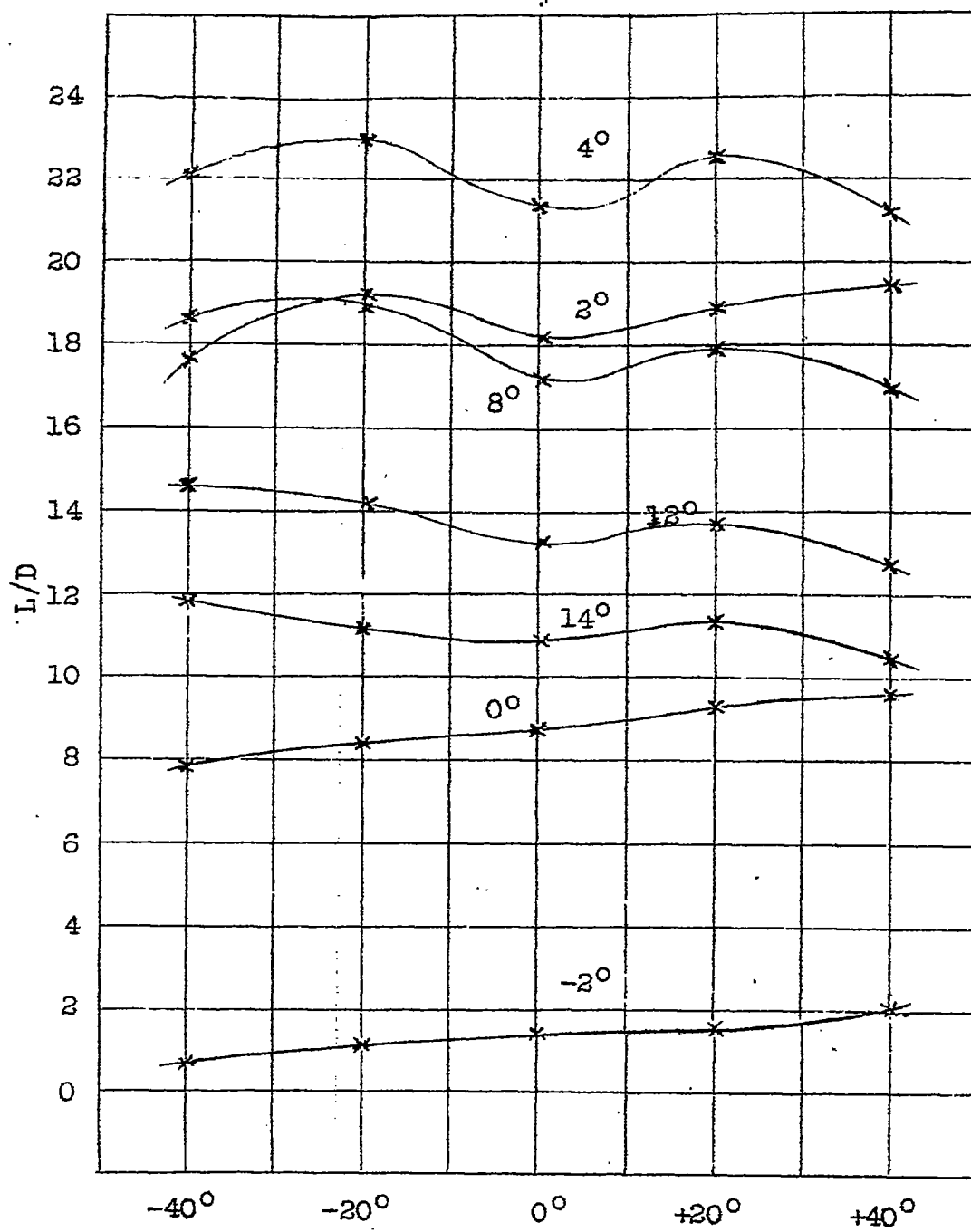


Fig. 4.

Angle of rake.